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E-Cigarette Use in Adults

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E-cigarettes are a consumer tobacco product designed to provide nicotine, often with the addition of flavors that may increase their appeal. Based on the 2021 National Health Interview Survey of 29 482 adults (50.9% response rate), 4.5% of US individuals aged 18 years or older were currently using electronic cigarettes (e-cigarettes), 11.5% smoked cigarettes, and approximately 1 million used both products. Currently, the US Food and Drug Administration (FDA) has authorized the commercial sale of 10 e-cigarette devices and 13 tobacco-flavored e-liquids in the US, but e-cigarettes are not FDA-approved as smoking cessation medications.

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E-Cigarettes and Health

Although e-cigarettes do not contain toxic products of combustion (eg, carbon monoxide) or the more than 70 carcinogens found in combusted cigarettes, few long-term data exist regarding e-cigarette use and health outcomes.[1,2] One narrative review concluded "toxicological analyses suggest that e-cigarettes can be safer than conventional cigarettes, although harmful effects from short-term e-cigarette use have been described."[2] A review of 17 systematic reviews that included 5 meta-analyses identified specific adverse effects related to e-cigarette use. For example, within minutes to hours of e-cigarette use, acute physiologic and cellular changes have been observed, including increased heart rate and blood pressure (BP), impaired endothelial function, increased oxidative stress, and evidence of airflow obstruction.[1] A 2023 study reported outcomes immediately after 395 individuals who used e-cigarettes exclusively vaped for 15 minutes, 117 individuals who smoked cigarettes exclusively smoked for 15 minutes, and 117 control participants who did not use nicotine products rested for 15 minutes.[3] Compared with controls, people who used e-cigarettes had greater increases in adjusted mean differences in systolic BP (5.6 mm Hg vs 2.3 mm Hg), diastolic BP (4.2 mm Hg vs 2.0 mm Hg), heart rate (4.8 beats/min vs −1.3 beats/min), and reduced forced expiratory volume in 1 second (difference in predicted values, −4.1% vs −1.0%), with values similar to cigarette users.[3]

Switching from combusted cigarettes to e-cigarettes may improve lung function, reduce respiratory symptoms in people with asthma or chronic obstructive pulmonary disease, and lower BP.[1] However, the individual studies were small, did not study effects of e-cigarette use over long-term follow-up, and included older generations of e-cigarettes, which use freebase nicotine and feel more harsh to users compared with the more currently used fourth-generation e-cigarettes, which are milder to inhale. High-quality data on long-term (ie, beyond 12 months) health effects of e-cigarette use alone or with combusted cigarettes are limited.

Current Options for Cigarette Smoking Cessation

Smoking combusted cigarettes is the leading preventable cause of death, disease, and disability worldwide and in the US.[4] Approximately 29.7 million adults in the US smoke cigarettes, but cigarette smoking is more common among certain groups (eg, people who are uninsured or enrolled in Medicaid, aged 65 years or younger, or who report serious psychological distress).[5] The FDA has approved 7 smoking cessation pharmacotherapies for which efficacy is enhanced when combined with smoking cessation counseling.[6] However, long-term quit rates, defined as abstinence for 6 months or more, are low (17% for nicotine replacement therapy [NRT], 19% for bupropion, and 26% for varenicline).[6] The FDA has not approved new pharmacotherapies for smoking cessation in more than 15 years. Due to the detrimental health effects of cigarettes and absence of newer or more effective medications, people who smoke may use e-cigarettes to aid smoking cessation.

E-Cigarettes for Smoking Cessation

A 2024 Cochrane systematic review[7] that included 7 randomized clinical trials of 2544 people motivated to quit smoking reported high-certainty evidence (ie, very confident that the true effect lies close to the estimate of the effect) that e-cigarettes with nicotine produced higher quit rates compared with NRT (relative risk [RR], 1.59 [95% CI, 1.29-1.93]; 7 studies, N = 2544); an additional 2 to 6 people out of 100 would stop smoking cigarettes with use of nicotine e-cigarettes compared with NRT. The authors also concluded with moderate certainty of evidence (ie, the true effect is likely to be close to the estimate, but there is a possibility that it is substantially different) that self-reported adverse events did not differ between those who used e-cigarettes vs NRT. However, few studies reported long-term safety, and the longest follow-up was 2 years after smoking cessation.

A 2024 trial randomized 1246 adults in Switzerland who smoked 5 or more cigarettes per day to standard smoking cessation counseling and a voucher to obtain NRT (control group) or to counseling, an NRT voucher, and free e-cigarettes and e-liquids (e-cigarette group). At 6-month follow-up, the primary outcome of biochemically validated continuous abstinence (anabasine <3 ng/mL) was significantly higher in the e-cigarette group compared with the control group (28.9% vs 16.3%; RR, 1.77 [95% CI, 1.43-2.20]).[8] Increased adverse events were reported in the e-cigarette group vs control group (43.7% vs 36.7%; RR, 1.19 [95% CI, 1.04-1.37]); serious adverse events did not differ between groups.

When used to aid smoking cessation, e-cigarettes may result in long-term e-cigarette use in adults, and it is unclear whether health risks are associated with long-term e-cigarette use, alone or in combination with continued cigarette smoking. At 6-month follow-up in the Swiss study,[8] 48.4% of individuals in the e-cigarette group continued to use e-cigarettes compared with 3.0% in the control group. In a randomized clinical trial of 886 people in the UK who smoked cigarettes, smoking cessation at 12-month follow-up was significantly higher in people with access to e-cigarettes compared with those with access to NRT (18% vs 9%; RR, 1.83 [95% CI, 1.30-2.58])[9]; 80% of the e-cigarette

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group participants who quit smoking continued to use e-cigarettes at 12 months.[9]

Clinical Approaches to Smoking Cessation

In 2021, the US Preventive Services Task Force (USPSTF) stated that all individuals who use tobacco should be offered evidence-based treatment.[6] For people who smoke cigarettes and are motivated to quit, treatment includes counseling and, for individuals who are not pregnant, FDA-approved pharmacotherapy, the most effective of which are varenicline and combination NRT (patch plus gum or mini-lozenges).[6] The USPSTF also concluded there was insufficient evidence to assess the balance of benefits and harms of e-cigarettes as a smoking cessation aid.[6] This recommendation was based on the absence of well-designed randomized clinical trials that reported smoking abstinence rates and adverse events associated with e-cigarette use.

If e-cigarettes are used as a smoking cessation aid, they should completely replace combusted cigarettes and be used in conjunction with evidence-based smoking cessation counseling.[6] Continued use of combusted cigarettes and e-cigarettes is an ineffective harm reduction strategy due to the adverse health effects of combusted cigarettes. A meta-analysis of 141 observational studies reported that smoking 1 cigarette per day was associated with increased coronary heart disease event risk among 2.3 million men (pooled RR, 1.48 [95% CI, 1.30-1.69]) and 2.3 million women (pooled RR, 1.57 [95% CI, 1.29-1.91]) (absolute rates not available).[10] It is unknown whether these harms are exacerbated by dual use of combustible cigarettes and e-cigarettes. The ultimate treatment goal should be cessation of e-cigarette use to minimize potential health risks. Individuals who are unable to stop vaping after successful smoking cessation may benefit from e-cigarette cessation treatment, which uses similar strategies to those used for smoking cessation, specifically pharmacotherapy and behavioral therapy.

Summary

Use of e-cigarettes may cause acute physiological effects, such as increased heart rate and BP and airway obstruction. The long-term health effects of brief or long-term e-cigarette use are unknown. There is evidence that e-cigarettes can help adults quit smoking and may be less harmful than combusted cigarettes. Therefore, although first-line treatment for smoking cessation is counseling and FDA-approved pharmacotherapy for individuals who are not pregnant, e-cigarettes may be considered for smoking cessation. The ultimate goal is smoking cessation followed by e-cigarette cessation once individuals feel confident they will not resume use of combusted cigarettes.

ARTICLE INFORMATION

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